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DRAFT

Software Requirements Specification
for the
Presentation Services Functional Area
of the
Defense Information Infrastructure (DII)

Common Operating Environment (COE)

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1. SCOPE

1.1 IDENTIFICATION

This Software Requirements Specification (SRS) defines the software requirements for the Defense Information Infrastructure (DII) Common Operating Environment (COE) Presentation Services area. The Presentation Services area is composed of the Executive Manager functional area and the Multimedia and Collaboration functional areas.

1.2 SYSTEM OVERVIEW

1.2.1 Common Operating Environment Overview

The Common Operating Environment is a set of common hardware and software services that ensure sharing and interoperability among global command and control and combat support applications.

1.2.2 Presentation Services Overview

The Presentation Services functional support area defines the functionality of the services required to manage processes and the graphical user interface. It also defines the software tools required to manipulate and manage multimedia information. These services are further defined in the two categories of Executive Manager and Multimedia, found throughout this document.

1.2.2.1 Executive Manager System Overview

The purpose of the executive manager functional area is to provide process management services for both batch and transaction processing, management of information flow between applications, and notification of critical events. Process management includes information processing, job and process control, menu executive services, security services, and queuing services. All information processing features should be available to Ada and C programs.

1.2.2.2 Multimedia and Collaboration System Services Overview

Multimedia services provide the capability to manipulate and manage information consisting of coordinated text, graphics, audio, imagery, animations and/or video. Multimedia services may be employed in a variety of application contexts, including multimedia presentations (e.g., situation assessment displays, course of action briefings, after action reviews), access to multimedia information collections (e.g., for intelligence analysis), collaboration among users (e.g., analysis, planning, course of action selection) including the use of multimedia mail and conferencing (e.g., video, audio), mission rehearsal, and training.

1.3 DOCUMENT OVERVIEW

This document outlines the software capabilities required for the Presentation Services module for the DII COE. It follows the format identified in DI-IPSC-81433 of MIL-STD-498. It

identifies the services the environment will provide, requirements for applications that use the environment, and standards to support interoperability among such applications and other elements of the DII COE.

This document is broken into several sections. Section 2 lists the documents which are applicable to this specification. Section 3 provides a list of functional capabilities for each Multimedia and Executive Manager areas including internal and external interfaces, security requirements, and design constraints. Section 4 identifies the qualification requirements. Section 5 traces the requirements back to services and agencies documents. Section 6 contains notes associated with the Executive Manager and Multimedia areas, which include requirements these have on the other DII areas.

2. APPLICABLE DOCUMENTS

2.1 GOVERNMENT DOCUMENTS

The following documents form a part of this specification to the extent specified herein. In the event of a conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

GCCS Common Operating Environment Baseline. November 28, 1994. DISA.

GCCS Common Operating Environment Requirements. August 15, 1994. DISA.

DRAFT, Architectural Design Document for the Global Command and Control System (GCCS) Common Operating Environment (COE), July 24, 1995.

User Interface Specifications for the Defense Information Infrastructure (DII), Draft Version 2.0, April 1996.

ABCS Common Software Segment Specification (CSSS), Draft, ACCS-A1-302-001B, 22 March 1995.

Intelink Standards Profile, Intelligence Systems Secretariat, ISS Standards Panel, 15 November 1994.

Multimedia Technology Standards Assessment, Version 2. DISA/JIEO Center for Standards, August , 1995.

DI-IPSC-81433, MIL-STD-498 DID for preparation of Software Requirements Specification (SRS).

United States Imagery Systems (USIS) Standards and Guidelines Ver 1.0 (CIO 2008), 10 October 1995.

Defense Information Infrastructure (DII) Common Operating Environment (COE) Integration and Runtime Specification (I&RTS), Version 2.0, 23 October, 1995.

Federal Information Processing Standards (FIPS) Document on H.323 and T.120. draft August 2, 1995.

Federal Information Processing Standards (FIPS) Document on 1003.2 POSIX Open Systems Environment.

2.2 NON-GOVERNMENT DOCUMENTS

2.2.1 Non-Government Documents for Executive Manager

Open Software Foundation, Motif Style Guide and User's Guide, Release 2.0 (Beta), Open Software Foundation.

Common Desktop Environment documentation.

2.2.2 Non-Government Documents for Multimedia

Interactive Multimedia Association Draft Recommended Practice for Multimedia Systems Services.

Interactive Multimedia Association Recommended Practice for Data Exchange, 1995.

Interactive Multimedia Association Architecture Reference Model, v.3.1, November, 1992.
ANSI 8632 Computer Graphics Metafile Specification Parts 1-4

TIFF. Revision 6.0 Final June 3, 1992.

T.120 ITU Standard documentation.

H.323 ITU Standard documentation.

3. REQUIREMENTS

3.1 REQUIRED STATES AND MODE

The states and modes in which presentation systems and services operate will be determined by the higher-level application software that uses it, and is therefore transparent to this area. Similarly, the presentation systems and services will be driven by available hardware and communications (e.g., video teleconferencing may not be available on all workstations, low bandwidth users may only have access to text browsers).

3.2 FUNCTIONAL CAPABILITIES

3.2.1 Executive Manager Functional Capabilities

The Executive Manager functional area provides standard services for the presentation and management of a common desktop environment and for the execution of the processes invoked by the user in the common desktop environment.

3.2.1.1 EM The Executive Manager shall provide a consistent, common desktop environment for presentation of, user interaction with and management of the DII COE.

3.2.1.2 EM The common desktop environment shall be standards-based, e.g., X/Open Common Desktop Environment for UNIX-based systems and Windows Graphical User Interface for Intel-based systems.

3.2.1.3 EM The common desktop environment shall comply with the DII Style Guide and any other applicable DII standards.

3.2.1.4 EM The common desktop environment shall provide the capability to customize the layout of the desktop in accordance with the DII Style Guide.

3.2.1.5 EM The common desktop environment shall allow the user the ability to easily configure the window manager's cosmetic features (e.g., colors, fonts) in accordance with the DII Style Guide.

3.2.1.6 EM The common desktop environment shall allow the user the ability to return to a default desktop layout and configuration.

3.2.1.7 EM The Executive Manager shall provide the capability to move files and directories within the user's common desktop environment.

3.2.1.8 EM The Executive Manager shall provide the capability to copy files and directories within the user's common desktop environment.

3.2.1.9 EM The Executive Manager shall provide the capability to create files and directories within the user's common desktop environment.

3.2.1.10 EM The Executive Manager shall provide the capability to delete files and directories within the user's common desktop environment.

3.2.1.11 EM The Executive Manager shall provide the capability to modify files and directories within the user's common desktop environment.

3.2.1.12 EM The Executive Manager shall provide the capability to read files and directories within the user's common desktop environment.

3.2.1.13 EM The Executive Manager shall provide the capability to format removable media.

3.2.1.14 EM The Executive Manager shall provide the capability to eject removable media.

3.2.1.15 EM The Executive Manager shall provide the capability to move files to removable media from the user's common desktop environment.

3.2.1.16 EM The Executive Manager shall provide the capability to move files from the user's common desktop environment to removable media.

3.2.1.17 EM The Executive Manager system shall provide an icon-based method for launching applications and system functions, which allows users to launch system objects directly. The Executive Manager will provide the connection between the GUI and application execution.

3.2.1.18 EM The Executive Manager shall provide an optional, configurable system menu bar for launching applications and system functions, which allows users to launch system objects directly. The Executive Manager will provide the connection between the menu and application execution.

3.2.1.19 EM The Executive Manager shall only display the system resources the user may access based on the user's active profile(s).

3.2.1.20 EM The Executive Manager shall provide a GUI-based capability to set the access permissions (e.g., read, write, execute, control, delete) of the user's system resources (e.g., files and directories).

3.2.1.21 EM The Executive Manager shall provide a GUI-based login capability which supports unitary login.

3.2.1.22 EM The unitary login capability shall support a transparent, distributed login.

3.2.1.23 EM The Executive Manager shall provide a GUI-based logout capability which terminates the user's login session.

3.2.1.24 EM The Executive Manager shall provide the capability to lock a user's account on the workstation after a configurable number of unsuccessful login attempts (e.g., failures to enter valid password, nominally three).

3.2.1.25 EM The Executive Manager shall display a security cover page indicating the system high water mark (e.g., the highest level the system can operate including compartments and categories).

3.2.1.26 EM The security cover page shall be acknowledged by the user prior to displaying the user's login session.

3.2.1.27 EM The Executive Manager shall provide a GUI-based profile selection mechanism with the following capabilities:

3.2.1.27.a EM The profile selection mechanism shall be available after successful user login when the following conditions are true:

(i) user possesses multiple profiles

(ii) profile selection mechanism is enabled

3.2.1.27.b EM The profile selection mechanism shall display the user's valid profiles, currently selected profile(s) and unselected profile(s).

3.2.1.27.c EM The profile selection mechanism shall allow a configurable number of selections, either 1 or n, where the user may be restricted to selecting one profile or can select any number of profiles up to n where n is the total number of valid profiles for the user.

3.2.1.27.d EM The profile selection mechanism shall be available during the user's session to change profiles without the need for the user to logout.

3.2.1.28 EM The Executive Manager shall establish and maintain the user's session until a logout action is initiated by the user or system. A session is the implementation of the user's profile(s) within the user's work environment from login to logout. The session provides the resources that the user needs to perform the functions of the user's profile(s).

3.2.1.29 EM The Executive Manager shall provide a read-only console window for display of system messages.

3.2.1.30 EM The Executive Manager shall display alerts in accordance with the DII Alerts Software Requirements Specification.

3.2.1.31 EM The Executive Manager shall provide the capability to blank and lock the user's screen during the user's session after a configurable period of inactivity.

3.2.1.32 EM The screen lock capability shall require that the user enter their password in order to unlock the screen.

3.2.1.33 EM The Executive Manager shall provide the capability to automatically logout the user from their session after a specified period of inactivity during the user's session.

3.2.1.34 EM The Executive Manager shall provide the capability to send an alert in accordance with the DII Alert SRS after a specified period of inactivity during the user's session.

3.2.1.35 EM The Executive Manager shall provide the capability to capture all or any portion of

the display screen.

3.2.1.36 EM The Executive Manager shall provide the capability to save the captured screen image in a file.

3.2.1.37 EM The Executive Manager shall provide the capability to selectively send print job(s) to printers.

3.2.1.38 EM The Executive Manager shall provide a GUI-based capability for the user to monitor and control their print queues in a heterogeneous environment and perform the following administration tasks:

> **3.2.1.38.a EM** The Executive Manager shall provide the capability to display the user's print queue status
>
> **3.2.1.38.b EM** The Executive Manager shall provide the capability to delete the user's print jobs from the print queue.

3.2.1.39 EM The Executive Manager shall provide a GUI-based capability for the user to change the password associated with their account.

3.2.2 Multimedia and Collaboration Functional Capabilities

The Multimedia and Collaboration functional area contains the following sub-areas: multimedia applications, collaboration services, text, vector graphics, raster graphics, imagery, video, audio, and data interchange services/standards. It is possible that a single software package may support more than one subcomponent. Text and graphics application requirements are specified in the office automation requirements specification, however, multimedia specific requirements are contained herein (e.g., hypertext). All multimedia software and services described below shall meet any higher level requirements as detailed elsewhere in software requirements specifications and other DII program documents (e.g., all applications shall provide a user interface that conforms to the DII Style Guide).

3.2.2.1 MM Multimedia Applications

Multimedia applications incorporate two or more multimedia data types and services (e.g., text, audio, video processing).

3.2.2.1.1 MM-MA Generic multimedia information access shall be provided by the approved DII version of a HyperText Markup Language (HTML) viewer (e.g., NSCA Mosaic, Netscape Browser, Microsoft Internet Explorer). The server and the client shall support "extension map files" to map file extensions to Multipurpose Internet Mail Extensions (MIME, RFC 1521) and Secure-MIME (S-MIME) and Secure Sockets Layer (SSL) types in order to support launching of appropriate applications to include plug-ins based on MIME type. The

browser shall provide a secure JAVA virtual machine environment (e.g., JAVA Developer Kit JDK 1.1) and JAVA script. (Priority 1)

3.2.2.1.2 MM-MA The presentation software shall support multimedia authoring (e.g., Netscape Composer, Assymetric Toolbook II, Microsoft FrontPage, MacroMedia Director). In order to support the authoring of automated hypermedia presentations, briefings, and after-action presentations, the presentation software shall support the temporal specification and real-time synchronization of multiple media in arbitrary combinations (e.g., text, animation, and audio scripting using standards such as HyTime, JAVAScript, or vendor formats). The software shall support the control of presentations, both in time and content, to include the ability to control audio and video (e.g., pan, zoom, point to displayed items). (Priority 1)

3.2.2.1.3 MM-MA The presentation software shall support the import, transformation, creation, editing, storage, retrieval, and export of multimedia information to include the import and display of proprietary formats (e.g., Microsoft PowerPoint data). (Priority 1)

3.2.2.2 MM Collaboration Services

Collaboration Services enable individuals and groups to communicate and work together in asynchronous and synchronous settings, ranging from formal meetings (e.g., pre-specified time, (virtual) place, agenda, and task) to informal interactions. This is necessary to enable distributed briefings, collaborative planning, analysis, and mission rehearsal.

3.2.2.2.1 MM-CS The software shall support synchronous point-to-point collaboration via:

1) shared whiteboards (including maps and images) (Priority 1)

2) audio conferencing (Priority 1)

3) text chatter (Priority 1)

4) video conferencing (Priority 2)

5) shared applications (Priority 2) (the distributed viewing, control and manipulation of, for example, office automation tools, browsers and geographic information systems).

3.2.2.2.2 MM-CS The software shall support the management of synchronous (i.e., real-time) multipoint collaboration sessions, to include (Priority 2):

- Session initiation and termination
- Use of directory services (e.g., Lightweight Directory Access Protocol (LDAP) Four I.I) to enable discovery of users and sessions.
- Connection to known users (to invite to sessions) and known sessions (to join them)
- Definition of user address books
- Location independence of user (for the nomadic user)

- Addition, deletion and exclusion of participants, throughout the session
- List of participating users in session
- The establishment and transfer of roles (e.g. chair, participant), where applicable in collaboration tools
- Persistence of sessional information to support on-going collaborations (e.g., the state of the data, applications, participants, task/environment)
- Security of sessions (e.g., X.509, Fortezza+/Krypton), to enable:
    - Private sessions - open only to invited participants
    - Public sessions - open to any participants
- Support for multiple concurrent sessions
- Advertisement of planned sessions, self-deleting after date expires
- Flexibility to support sharing of different tools for different participants in session
- Management of sessions with lower bandwidth users

3.2.2.2.3 MM-CS The software shall support asynchronous multi-user collaboration via multimedia mail, news groups, and World Wide Web pages. (Priority 1)

3.2.2.2.3.1 MM-CS The News server shall support NNTP, threading of discussions, and support for secure sessions (e.g., S-MIME, SSL, access control, digital signatures). Desirable features include server side searches, graphical user interface for management, LDAP support, support for variable format posting and viewing (e.g., MIME, HTML, GIF, JPEG), hyperlinks, network based access control, and support for pull feeds. News client will support viewing of multiple formats (MIME, HTML, GIF, JPEG).

3.2.2.2.4 MM-CS The whiteboarding tools (Priority 1) shall provide:

- Support for multiple users annotating simultaneously (including individualized cursors that are visually distinct and identify user) (Priority 1)
- Ability to import image formats as whiteboard background, including screen capture (window, entire screen, user defined area), NITF, JPEG, GIF, and Postcript (Priority 1)
- Support for 8-bit and 24-bit imports (Priority 1)
- Ability to export image background and annotations to JPEG (burned in annotations), NITF (nondestructive annotations), Postscript (burned in annotations), TIFF (burned in annotations), GIF (burned in annotations) (Priority 1)
- Gesturing/pointing tool
- Text, line, arrow, rectangle, circle, oval, polygon, free draw annotation tools, multi-color annotations
- Ability to import custom symbols for annotations
- Geopositioning of symbols on imported maps
- Attributed annotations (e.g., user, date, comments) and the ability to store and retrieve meta data with annotations
- Ability to overlay vectors (e.g., VPF, CGM) on raster backgrounds.
- Nondestructive whiteboard annotations

- Ability to add/remove users during session
- Persistence of whiteboards for on-going collaborations (e.g., ability to save and recall state)
- Support for Secure whiteboard sessions
- Support for T.126 series interoperability standards (Priority 1)
- Plug-in capability to expand functionality

3.2.2.2.5 MM-CS The audio conferencing software shall provide (Priority 2):

- Point to point and multipoint, multi-user conferencing
- Multiple operating modes (e.g., support for interactive conference (people sending and receiving from multiple sites), support for one-way conferences (one site sending, all other sites receiving)
- Ability to add/remove users during a conference
- Support for speaker/microphone control.
- Push to talk
- Audio mute on send and receive, near and far
- Support for private side conferences (whisper mode)
- An adjustable bandwidth control
- Adaptation to lowest common audio denominator for lower bandwidth participants (e.g., automatic protocol negotiation)
- Support down to 2400 baud per second and support up to 8 Khz audio.
- Support for secure audio conference channel
- Ability to save and recall audio conference (e.g., in ADPCM, MPEG formats) (Priority 2)
- Gateway to other audio conferencing formats
- Support for GSM, LPC-10 (2.4), CELP, and G.700 series interoperability standards (Priority 1)
- Support for full duplex

3.2.2.2.6 MM-CS The shared applications shall provide (Priority 2):

- Point to point and multipoint, multi-user shared applications
- Ability to share single or multiple applications
- Ability to share applications with different subsets of users
- A range of modes of operation (e.g., view only sharing per application, view and control sharing per application, the ability to change view/control modes during session)
- Visual distinction of users cursors (i.e., initials, colors)
- A gesturing / pointing tool
- Ability to add/remove users during conference per application
- Persistence of data files for on-going collaborations
- Secure application sharing sessions

3.2.2.2.7 MM-CS The shared browser shall provide (Priority 2):

- Point to point and multipoint, multi-user shared web browsing
- Add/remove users during web browsing session
- Establish roles (e.g., session leader, participants)
- Transfer of roles (e.g., session leader, participants)
- Secure web browsing sessions

3.2.2.2.8 MM-CS The shared video software shall provide shared video, to include (Priority 2):

- Point to point and multipoint, multi-user shared video viewing
- Ability to add/remove users during video sharing session
- Ability to share digitized video or NTSC video feed
- Ability to manipulate digitized video (e.g., Play, stop, fast forward, frame forward, reverse, frame reverse, pause)
- Ability to annotate live or paused video on an overlay (e.g., course of action annotations over PREDATOR feed) by frame grabbing video image and annotations and save to file (including JPEG, Postcript and GIF)
- Secure shared video sessions

3.2.2.2.9 MM-CS The video conferencing software shall provide (Priority 2):

- Point to point and multipoint, multi-user conferencing
- Multiple operating modes (e.g., support for interactive conference (people sending and receiving from multiple sites), support for one-way conferences (one site sending, all other sites receiving)
- Ability to add/remove users during a conference
- An adjustable frame rate
- An adjustable compression ratio
- An adjustable image size
- Adaptation to lowest common audio and video denominator for lower bandwidth participants
- Support for rate governing
- Support for secure video conference channel
- Ability to save and recall video conference (MPEG) (Priority 2)
    - Frame grab video image and save to file (e.g., JPEG, Postcript, GIF)
- Gateway to other conferencing formats
- Support for H.320 series interoperability standards (Priority 1)

3.2.2.3 MM Text Processing

The Office Automation area will specify requirements for Text Processing software for text input, editing, storage, retrieval, and printing. Additional requirements (e.g., for hypertext) are contained in this Specification.

3.2.2.3.1 MM-TP The Text Processing software shall support hypertext (e.g., HyperText Markup Language (HTML)) generation, editing (to include wysiwyg HTML editing), validation (e.g., as conformant to a particular version of HTML), conversion, storage, retrieval, display, and navigation. Priority 1

3.2.2.3.2 MM-TP The software shall support the input, editing, conversion, access, storage, retrieval, and display of multiple electronic formats for text (e.g., ASCII), page layout (e.g., PostScript, Adobe Acrobat's Portable Document Format (PDF)), and document interchange (e.g., RTF, SGML). (Priority 1)

3.2.2.3.3 MM-TP The software shall be extensible to, or currently support, the management of text encoded in Standard Generalized Markup Language (SGML).. The software shall support the creation of Document Type Definitions (DTDs) and Style Sheets, including the definition of international character sets, mathematical expressions, and embedded comments. It shall include an SGML parser that can validate conformance of document instances to particular DTDs (e.g., HTML, HyTime). The software shall support access to document collections by SGML tag and tag attribute-value (e.g., <AUTHOR>, <AUTHOR name="Maybury">). (Priority 3).

3.2.2.4 MM Graphics Processing

The Office Automation Software Requirements Specification will detail requirements for Graphics Processing software for graphics, including input, editing, storage, printing, screen capture. Additional requirements (e.g., relating to hypermedia) are contained herein.

3.2.2.4.1 MM Raster Graphics

3.2.2.4.1.1 MM-RG The Raster Graphics software shall support the import, display, and export of TIFF R/G (Tagged Image File Format), JPEG, and GIF (Graphics Interchange Format) file formats, and it may also support EPS (Encapsulated PostScript), Group 3 and 4 fax file format and Raster Product Format (RPF) (the latter for mapping products). (Priority 1)

3.2.2.4.1.2 MM-RG The Raster Graphics software shall provide a video capture capability which interfaces with digital cameras (Kodak DCS, Sony DVBK-1000) and commercial frame grabber boards (e.g., the Sun VideoPix frame grabber board). (Priority 2)

3.2.2.4.1.3 MM-RG The Raster Graphics software shall provide screen capture and display (e.g., Sun Raster, X-XWD) and shall support exchange of data in Bit Map (BMP) format with windows-based platforms. (Priority 1)

It should be noted that whereas many intelligence organizations are creating GIF graphic files for use with HTML browser, because this is a compressed, low-resolution format, these may require conversion and/or be insufficient for reuse in certain DII applications, depending upon data interchange requirements. Because of data interoperability problems with Microsoft PowerPoint files, GIF file use should be minimized.

3.2.2.4.2 MM Vector Graphics

3.2.2.4.2.1 MM-VG The Vector Graphics software shall support the import, editing, and export of CGM (Computer Graphics Metafile) file format. (Priority 1)

3.2.2.4.2.2 MM-VG The Vector Graphics software shall support the import, editing, and export of Vector Product Format. (Priority 1)

3.2.2.4.2.3 MM-VG The Vector Graphics software shall support the conversion from CGM to raster graphics formats to include at least JPEG. (Priority 1)

3.2.2.4.2.4 MM-VG The Vector Graphics software shall support the creation, storage, and embedding of text and raster graphics in CGM and VPF. (Priority 1)

3.2.2.5 MM Imagery and Image Processing

3.2.2.5.1 Imagery Standards

A suite of MIL standards developed by the Central Imagery Office (CIO) and approved by DOD known as the National Imagery Transmission Format Standard (NITFS) shall be used to format digital imagery and imagery-related products, for image compression algorithms, and for communication protocols. (Priority 1)

The NITFS suite includes the following key military standards:

- *National Imagery Transmission Format (Version 2.0) for NITFS* describes the NITF Format itself: the field definitions and field content specifications Data formats support four types of data: image, symbols (graphics), labels, and text

- *Computer Graphics Metafile (CGM) Implementation Standard for the NITFS* profiles the ISO CGM 89 standard that has been adopted for the description of non-photographic data, such as overlays and maps. The DII direction for creation, storage, reuse, and transmission of still visual data is Computer Graphics Metafile (CGM) and NITFS. Both allow for use of data across platforms, across applications, and can accommodate hard copy and soft copy. CGM and NITFS are still the targets for cross-platform, cross-application movement, use, and storage of intelligence still visual data.

- *Bi-level Image Compression* (CCITT T.4 [Group 3]) for the NITFS profiles one of the compression options available for NITFS.

- Vector Quantization Image Decompression for the NITFS accepts and decompresses image data that are compressed using a VQ compression algorithm.

- *Joint Photographic Experts Group (JPEG) Image Compression for the NITFS* profiles an ISO standardized compression option for sequential coding. NITFS supports the

wrapping of still imagery in a single file with associated data, or links to associated data of any variety. This imagery data may include any combination of still visual data including maps, imagery, or graphic. Photographic data are presented as a bit-map format, while associated non-photographic data are given in the CGM format. Further, the NITFS include the capability to manage security related information without destructive annotations to the imagery.

3.2.2.5.2 Image Standards

An image is a raster graphic captured by photographic means (e.g., satellite, digital camera, scanned images). Image capture and scanning is the responsibility of the end users, but the file formats that they generate must conform to the following standards. The image software shall provide the capability to import, display, and export of image and graphics data in those formats stated in the Raster Graphics section above. (Priority 1)

3.2.2.5.3 Imagery and Image Functional Capabilities

3.2.2.5.3.1 MM-IP The Display and Manipulation software shall provide the capability to display the image in (1) gray-scale and (2) 24-bit color. (Priority 1)

3.2.2.5.3.2 MM-IP The Display and Manipulation software shall provide the capability to zoom, pan (roam) the image area both horizontally and vertically, rotate the image and flip the image. It shall support color changes and the ability to crop images. (Priority 1)

3.2.2.5.3.3 MM-IP The Display and Manipulation software shall provide the capability to change, enhance, and sharpen contrast for either the entire image or a selected area of the image. (Priority 1)

3.2.2.5.3.4 MM-IP The Display and Manipulation software shall provide the capability to select an Area of Interest (AOI) and manipulate it independently of the original image, as was well as to annotate the image nondestructively with text information, and graphical annotations including boxes and circles. (Priority 1)

3.2.2.5.3.5 MM-IP The Display and Manipulation software shall provide a compression algorithm compliant with NITFS.

3.2.2.6 MM Video Processing

3.2.2.6.1 MM-VP The Video Processing software shall provide the capability to control the recording/importing, displaying, and exporting of analog video data in NTSC, PAL, Secam, and S-Video formats. (Priority 2)

3.2.2.6.2 MM-VP The Video Processing software shall provide the capability to import, record (from analog or digital sources), display, and export digital video data in certified

(1) ISO/IEC 11172-2 (MPEG-1) (Priority 1)

(2) ISO/IEC 13818-2 (MPEG-2) file format (Priority 2)
(3) QuickTime file format (Priority 2)
(4) Microsoft Video for Windows file format (Priority 2)
(5) AVI for Sun file format (Priority 2)

where MPEG stands for Motion Picture Experts Group.

3.2.2.6.3 MM-VP The Video Processing software shall provide the capability to convert among the above formats. (Priority 1)

3.2.2.6.4 MM-VP The Video Processing software shall provide the capability to edit (e.g., cut and paste (Priority 1)) and create special effects (such as dissolves, cuts, and fades among video clips (Priority 3)) video and related components (e.g., images, audio, text) including captured contents of a video teleconference.

3.2.2.7 MM Audio Processing

Audio files come in various formats and there are currently no agreed upon standards. The file extension used on Intelink is .au (Sun OS sound file format), one of several de facto standards. DII will utilize this format until an open standard is more widely adopted. While not a current DII requirement (current DII platforms include Sun and Hewlett Packard), sound cards and software are available to support the interpretation of these sound files by machines running Microsoft Windows. The audio used in teleconferencing applications shall generally conform to one of the existing or emerging ITU-T G.700 series recommendations, G.711, G.722, G.723, or G.728, or MPEG-2 audio, ISO 13818-3. (Priority 1)

3.2.2.7.1 MM-AP The Audio Processing software shall provide the capability to import, record, display, and export digital audio data in .au, ITU-T G.700 series, and MPEG-1 and 2 formats. (Priority 1) Conversion to/from voc, midi, wav, and aiff file formats is desirable. (Priority 2)

3.2.2.7.2 MM-AP The Audio Processing software shall provide the capability to convert among the above formats. (Priority 2)

3.2.2.7.3 MM-AP The Audio Processing software shall provide the capability to edit audio (e.g., cut, paste, adjust volume over time). (Priority 2)

3.2.2.7.4 MM-AP The Audio Processing software (Priority 1) shall provide the capability to:

- add and remove users (Priority 1),
- change audio volume (Priority 1),
- change microphone volume (Priority 1),
- audio mute on send and receive (Priority 1),
- “push to talk” to activate audio transmission (Priority 1),
- user bandwidth control or compression mechanism selection (Priority 2),
- support secure audio conferencing (Priority 1),

- Automatic bandwidth negotiation among conference participants (supporting automatic drop to lower bandwidth to support users with low-bandwidth communications) (Priority 2),
- full duplex (Priority 2) and
- support for private side conferences (e.g., point-to-point in a multipoint setting) (Priority 2).

3.2.2.8 MM Data Interchange Standards

Critical to the data sharing that DII will require are data interchange standards that provide standard encoding methods for the various types of multimedia data. Table 1 details recommended formats, file name extensions, viewing applications, and associated standards references for the different types of multimedia data. Optional items are italicized. While standards for some types of data are based on international and/or public specifications and are stable, others are newly emerging data types, merely de facto and vendor-specific. There are several emerging standards associated with NIDR tools that may be used today with confidence that such use will entail little risk of significant changes to the standards including HyperText Transfer Protocol (HTTP) and Uniform Resource Locator (URL). These and all standards need to be continuously monitored and reviewed (e.g., the evolution from URL to Uniform Resource Name (URN)). Selection among alternative standards should be accomplished through a consensus based organization, such as a DII Standards Panel associated with the Architecture Oversight Group.

Table 1. Data Interchange Standards Profile

(Optional items are italicized)

Multimedia Service Area	Standard/Format/ Convention	File Name Extension	Viewing Application	Standards Reference Number
Multimedia	MPEG-1, MPEG-2			ISO 11172-2, ISO 13818-2
Text	ASCII	txt	Mosaic/Netscape	ISO 646
Hypertext	HTML *HyTime*	htm or html	Mosaic/Netscape *Vendors*	Internet Draft *ISO/IEC 10744:1992*
Page Layout	PostScript PDF	ps pdf	Vendors Vendors	Vendor Format Vendor Format
Document Interchange	RTF *SGML*	rtf *sgm or sgml*	Vendors *Vendors*	Vendor Format *FIPS Pub 152, ISO/8879*

Raster Graphics	JPEG *TIFF (R,G)* *GIF* *EPS* *Group 3 and 4 fax* Raster Product Format *Sun Raster* *X-XWD*	jpg or jpeg *tif or tiff* *gif* *eps* RPF *ras* *xwd*	XV *XV (X11)* *Mosaic/Netscape* *Vendors* *Vendors* Vendors *XV* *XV*	ISO10918, MIL-STD-188 *Vendor Format* *Vendor Format* *Vendor Format* *Vendor Format* MIL STD 2411 *Vendor Format* *Vendor Format*
Vector Graphics	CGM Vector Product Format	cgm VPF	 VPF View	ISO 8632.1-4:1992, FIPS 128-1, MIL-D-28003 MIL STD 2407
Imagery	NITFS 2.0 JPEG Bi-Level Image Vector Quantization Decompression	nit or nitf jpg or jpeg	Mate XV	MIL-STD-2500A ISO10918MIL-STD - 188-198A MIL STD 188-196 MIL-STD 188-199
Sychronous Conferencing	Video Teleconference Data Conferencing	(no storage) (no storage)	(VTC software) Whiteboards	H.32X T.120
Video	MPEG-1, *MPEG-2* *QuickTime* *Video for Windows*	mpg, mpeg *qt or mov* *avi*	mpeg_play	ISO 11172-2, ISO 13818-2) *Vendor Format* *Vendor Format*
Audio	ADPCM MPEG-1, *MPEG-2*	au mpg or mpeg	play, showaudio mpeg_play	Vendor Format (Sun OS) ISO/IEC 11172-3, ISO/IEC 13818-3

3.3 EXTERNAL INTERFACE REQUIREMENTS

3.3.1 Executive Manager External Interface Requirements

The external interface requirements for Executive Manager are minimal. The executive manager will interface with system and support modules for process management, session management,

and desktop management. It will interface through the icons for the modules, launching the modules, and providing status of the modules during execution.

3.3.2 Multimedia External Interface Requirements

3.3.2.1 Functional Area Interfaces

The requirements for Multimedia software and services is strongly related to the Office Automation, Desktop, Data Interchange, Style Guide, Communication, Network Services, and Mapping, Charting and Geodesy areas.

3.3.2.1.1 Word processing and graphics packages chosen for Office Automation shall support multimedia formats specified in this document, in accordance with the documented priorities. (Priority 1)

3.3.2.1.2 Data Access Services shall include Data Exchange services for formats required by multimedia software and services. Priority 1 The Data Management area shall provide the ability to store and retrieve multimedia files by multimedia document type in the file system. (Priority 1)

3.3.2.1.3 The Operating System shall support machine and operating system specific drivers for multimedia devices. (Priority 1) The Operating System shall support the management of real time cross-media synchronization of streamed data. (Priority 4)

3.3.2.1.4. The Communication area shall support protocols for multimedia data interchange over networks including tools and protocols for file transfer (FTP), message transfer (SMTP, MIME, X.400), directory service (DNS, X.500), terminal emulation (telnet), remote file access (NFS), remote login (telnet), Network Information Discovery, and Retrieval (NIDR) (HTTP, Z39.50, Gopher, Mosaic, WAIS, Chat, Veronica, Archie), and tools to support collaboration. (Priority 1)

3.3.2.1.5 Recommended directory structure for multimedia servers and clients shall be provided by the Developer's Toolkit.

3.3.2.1.6 Networking Services shall provide support for stream data as well as facilities to test and manage variable quality of service levels for differing users, applications, and operational situations. (Priority 2)

3.3.2.1.7. The Mapping, Charting and Geodesy area shall support data interchange formats for textual, graphical, and vector information compatible with those indicated in this document to enable the import and export of mapping information in multimedia applications. (Priority 1)

3.3.2.1.8 Executive Manager will need to support a clipboard facility for data interchange that supports the interchange and format standards specified in this SRS. (Priority 1)

3.3.2.2 Physical Interfaces

The input and output of multimedia data can require internal hardware support (e.g., video boards, television tuners, CD-ROMs), network components (e.g., ATM switches), and interfaces to input/output multimedia devices (e.g., cameras, microphones, large screen displays). The following physical interfaces shall be supported for the following media types:

Video: NTSC, S-Video, PAL, SECAM, composite, RGB, video in/out

Audio: two wire, stereo/monophone audio in/out, microphone level, line level

The software shall support interfaces to standard scanning devices (Priority 2), plotters (Priority 3) and printers. (Priority 1) Finally, support shall be provided for input to and output from storage media including hard disk drives, CD-ROM, tape drives, and large disk arrays. (Priority 1)

3.4 INTERNAL INTERFACE REQUIREMENTS

3.4.1 Executive Manager Internal Interface Requirements

The internal interfaces for Executive Manager include providing a Graphical User Interface to each of the COE components that require this interface to the user. Other internal interfaces include receiving the status of services from the other COE components during launch and execution. It will also interface with security portions of the DII COE during login, screen lock and logout.

3.4.2 Multimedia Internal Interface Requirements

The requirements for the internal interfaces within the individual multimedia package shall be contained within the requirements for each package.

3.5 INTERNAL DATA REQUIREMENTS

Each package or service within the Presentation Services area shall be able to exchange data using cut and paste as well as be able to interchange data via data interchange formats as specified within each package.

3.6 ADAPTATION REQUIREMENTS N/A

3.7 SAFETY REQUIREMENTS N/A

3.8 SECURITY AND PRIVACY REQUIREMENTS

Each type of multimedia data shall support the marking of appropriate classification, privacy, and copyright levels. Data and system security is assumed to provided by Security Services.

3.9 ENVIRONMENT REQUIREMENTS

The Presentation Services modules shall operate on the required DII hardware platforms running the specified application software and operating systems. (Priority 1)

3.10 COMPUTER RESOURCE REQUIREMENTS

The Presentation Services modules shall support operating systems, database management systems, communications/ network software utility software, input and equipment simulators, test software, and manufacturing software as indicated on other DII COE SRSs.

Some applications (e.g., conferencing) will require hardware cards (e.g., audio, video), software drivers, additional storage space for video/audio/image capture, and possibly hardware peripherals such as video cameras, microphones, and speakers. The software system shall provide the software drivers necessary to integrate this additional hardware (e.g., video cards, audio cards).

3.11 SOFTWARE QUALITY FACTORS

Software quality factors do not apply to software within this functional area that are COTS. Government developed software shall be formally tested and evaluated by a DII COE approved process.

3.12 DESIGN AND IMPLEMENTATION CONSTRAINTS

The Presentation Services modules shall be compatible with DII COE documentation and guidelines and shall support the DII COE objective architecture. Web browsers used for multimedia should be the approved DII COE version of a HyperText Markup Language (HTML) viewer (e.g., NSCA Mosaic or Netscape). All Executive Manager designs and implementations shall be in accordance with the DII COE Style Guide.

3.13 PERSONNEL-RELATED REQUIREMENTS

Presentation Services modules shall conform to accepted human factors guidelines and practices to support ease of use, training, and performance.

3.14 TRAINING-RELATED REQUIREMENTS

Each application shall provide embedded on-line training and context sensitive help. On-line training should be indexed, searchable and printable.

3.15 LOGISTICS-RELATED REQUIREMENTS

None.

3.16 DOCUMENTATION-RELATED REQUIREMENTS

The software services shall include installation and user guides as well as engineering/integration documentation (e.g., detailing application programming interfaces).

4. QUALIFICATION REQUIREMENTS

This section captures how individual software services shall be evaluated for satisfying stated requirements. Compatibility with DII specified hardware platforms and operating system versions is required. Our minimum qualification requirements include: cross platform support (e.g., UNIX and NT), interoperability (e.g., H.323 and T.120 standards compliance), and support of internet protocol based collaboration. Some qualifications will be environment specific such as site or agency specific security requirements, including physical and network security (e.g., collaboration through firewalls, push to talk microphones). Software should be interoperable with any hardware peripherals (e.g., microphones, speakers, video boards).

4.1 QUALIFICATION METHODS

Each of the Presentation Services modules must be tested with each type of DII hardware platform and with each type of operating system. All systems should be performance tested in an environment representative of the operational environment in which they will be deployed, e.g., for bandwidth, security, and platform support. Also, multiple applications must be tested in the various mixes they may occur (e.g. color flashing resulting from color map contention).

Standards compliance requires certification by an independent third party (e.g., JTIC). User feedback should be solicited on minimal acceptable performance (e.g., to support low or variable bandwidth requirements of tactical user). Applications (e.g., video, audio, whiteboard, chat) should be tested in conjunction with one another.

Appendix A contains a detailed checklist of requirements qualifications for individual functional areas.

4.2 SPECIAL QUALIFICATION METHODS

Once a DII user determines that he/she has a need for a Multimedia module, he/she should consult the "best of breed" process, ensuring this is compatible with other requirements, such as those represented in office automation requirements.

Qualification methods include:

A. Demonstration. The operation of the functional capability that relies on observable functional operation not requiring the use of elaborate instrumentation or special test equipment.
B. Analysis. The process of accumulated data obtained from other qualification methods. Examples are interpretation of extrapolation of test data.

C. Inspection. The visual examination of software code, documentation, etc.

5. REQUIREMENTS TRACEABILITY

6. NOTES

6.1 MULTIMEDIA DEFINITION

The Interactive Multimedia Association defines multimedia as "two or more media types (audio, video, imagery, text, and data) electronically manipulated, integrated, and reconstructed in synchrony".

6.2 IMPACT ON OTHER FUNCTIONAL AREAS

As the Presentation Services functional area touches upon several other areas, it is important that each of the other functional areas review the requirements contained herein in order to determine if the requirements meet their needs. The data produced by the office automation modules can be imported in a suitable format.

The Multimedia working group requests that each area provide any additional format requirements so that these can be added to this SRS.

6.3 NETWORK PERFORMANCE GUIDELINES

While minimum bandwidth requirements for effective performance will be dependent upon individual tool requirements and networks, experience shows that 2400 bps is the minimum bandwidth recommended for chat services.

6.4 INTELINK RECOMMENDED SOFTWARE

Intelink, the strategic direction for sharing of information within the Intelligence Community, is founded upon several free-ware software packages to provide users access to intelligence products. These include:

- XMosaic -- Browser for X Windows for SUN, DEC, etc.
- mpeg_play -- viewer for compressed video in mpeg format
- showaudio -- viewer for sound files .au
- xv -- viewer for image files .gif .tiff .jpeg
- xplaygizmo -- controller for multi-media viewers
- httpd -- hypertext transport protocol(http) server
- plexus -- http server
- wais -- a collection of programs providing text search capability
- gopher -- file dissemination server

6.5 MISSION SPECIFIC REQUIREMENTS

DoD Health Affairs has a requirement for DICOM v3.0 image format. DICOM images used for medical diagnosis and require high resolution (2Kx2K) displays. These requirements are mission specific.

6.6 ROOM BASED VTC

Given that this SRS focuses on H.323 for IP based systems and not room based systems, teleconferencing software shall conform to the Industry Profile for Video Teleconferencing (VTC001-Rev. 1, April 25 1995) where applicable.

6.7 WEBCASTING

Webcasting services are an emerging area and we solicit specific mission requirements and services.

APPENDIX A SOFTWARE Product Evaluation Checklist

Audio Conferencing

- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
- TCP/IP
- Multi-user conferencing (>2) [Identify MCU, Multicast, Peer to Peer]
- Interactive conferences [Full duplex, half duplex]
- 1-way broadcast conferences
- User bandwidth control
- Dynamic addition/removal of users during conference
- Conference participation control (private, no eavesdropping)
- G.711 (PCM 64 kb/s mu-law)
- G.723.1
- G.728
- GSM
- LPC-10 (2.4)
- CELP
- Other CODECs supported (list)
- Mic volume control
- Mic mute on send
- Output volume control
- Audio mute on receive end
- Dynamic bandwidth control
- Lowest bandwidth with reasonable audio quality
- Push to talk
- Hands free talk mode
- Save audio conference
- Supports side conversations
- Gateways to other conferencing formats supported (list)

Shared Whiteboard

- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
- TCP/IP
- Multi-user conferencing (>2) [Identify MCU, Multicast, Peer to Peer]
- Import backdrop formats (8 and 24-bit)
- - Captured window
- - Selected screen area
- - JPEG image
- - Raster image
- - NITF image (bring in meta data)
- - GIF image

- Postscript image
- Export backdrop image and burned in annotations
- - JPEG
- - TIFF
- - GIF
- - Postscript
- - NITF (annotations not burned in and maintain meta data)
- Nondestructive annotations during session
- Annotation tools for text, line, arrow, rectangle, circle, oval, polygon, freedraw
- Conference participation control (private, no eavesdropping)
- Gesturing/pointing tool
- Dynamic addition/removal of users during session
- Multiple users (>2) annotating simultaneously
- Persistence of whiteboards for use in future sessions
- T.126
- Multi-color annotations
- Functionality plug-ins
- Import custom symbols for annotations
- Overlay vector graphics (VPF, CGM) on raster backgrounds
- Geopositioning of symbols on imported maps
- Attributed annotations: user, date, comments
- Multi-user sharing of applications (>2) [Identify MCU, Multicast, Peer to Peer]
- Share single or multiple applications
- Share applications with different subsets of users
- Support range of sharing modes of operation (e.g., view only sharing per application, view and control sharing per application, the ability to change view/control modes during session)
- Visual distinction of users cursors in shared application (i.e., initials, colors)
- Gesturing / pointing tool
- Ability to add/remove users during conference per application
- Persistence of data files for on-going collaborations
- Secure application sharing sessions (private, no eavesdropping)

Video Conferencing

- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
- TCP/IP
- Multi-user conferencing (>2) [Identify MCU, Multicast, Peer to Peer]
- Interactive conferences
- 1-way broadcast conferences
- User bandwidth control
- - Adjustable frame rate
- - Adjustable compression ratio

- - Adjustable image size
- Dynamic addition/removal of users during conference
- Conference participation control (private, no eavesdropping)
- H.323
- Other CODECs supported (list)
- Dynamic bandwidth control
- - Adjustable frame rate
- - Adjustable compression ratio
- - Adjustable image size
- Adapt to lowest common denominator
- Rate governing
- Save video conference
- Frame grab a video image
- Gateways to other conferencing formats supported (list)

Session/Conference Management

- Session initiation and termination
- Discovery of users
- Discovery of sessions
- Make use of directory service
- Directory support for changing location of user
- Reserve conference sessions, to include recurring
- Advertisement of planned sessions, self-deleting after date expires
- Invite users to session
- Request to join a session
- User defined address books providing user view of directory server
- Dynamic removal of participant during session
- List of participating users in session
- Logging of attendees of conference
- Establishment and transfer of the session manager role
- Persistence of sessional information (e.g., state of data, participants, task/environment)
- Private sessions open only to invited participants
- Public sessions open to any participant
- Support for multiple concurrent sessions
- Flexibility to support sharing of different tools for different participants in session
- Management of sessions with varying bandwidth participants
- Number of simultaneous users a server can support
- Server to server communication (for scalability)

Shared Applications

- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
- TCP/IP

- Multi-user sharing of applications (>2) [Identify MCU, Multicast, Peer to Peer]
- Share single or multiple applications
- Share applications with different subsets of users
- Support range of sharing modes of operation (e.g., view only sharing per application, view and control sharing per application, the ability to change view/control modes during session)
- Visual distinction of users cursors in shared application (i.e., initials, colors)
- Gesturing / pointing tool
- Ability to add/remove users during conference per application
- Persistence of data files for on-going collaborations
- Secure application sharing sessions (private, no eavesdropping)

Shared Web Browsing

- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
- TCP/IP
- Multi-user web browsing (>2) [Identify MCU, Multicast, Peer to Peer]
- Add/remove users during web browsing session
- Establish roles (e.g., session leader, participants)
- Transfer of roles (e.g., session leader, participants)
- Secure web browsing sessions (private, no eavesdropping)

Shared Video

- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
- TCP/IP
- Multi-user sharing (>2) [Identify MCU, Multicast, Peer to Peer]
- Ability to add/remove users during video sharing session
- Ability to share digitized video or NTSC video feed
- Ability to manipulate digitized video (e.g., Play, stop, fast forward, frame forward, reverse, frame reverse, pause)
- Ability to annotate live or paused video on an overlay (e.g., course of action annotations over PREDATOR feed) by frame grabbing video image and annotations and save to file (including JPEG, Postcript and GIF)
- Secure shared video sessions (private, no eavesdropping)
- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
- TCP/IP
- Multi-user conferencing (>2) [Identify MCU, Multicast, Peer to Peer]
- Interactive conferences [Full duplex, half duplex]
- 1-way broadcast conferences
- User bandwidth control
- Dynamic addition/removal of users during conference
- Conference participation control (private, no eavesdropping)
- G.711 (PCM 64 kb/s mu-law)
- G.723.1

- G.728
- GSM
- LPC-10 (2.4)
- CELP
- Other CODECs supported (list)
- Mic volume control
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- Audio mute on receive end
- Dynamic bandwidth control
- Lowest bandwidth with reasonable audio quality
- Push to talk
- Hands free talk mode
- Save audio conference
- Supports side conversations
- Gateways to other conferencing formats supported (list)

Shared Whiteboard

- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
- TCP/IP
- Multi-user conferencing (>2) [Identify MCU, Multicast, Peer to Peer]
- Import backdrop formats (8 and 24-bit)
- - Captured window
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Video Conferencing

- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
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- Multi-user conferencing (>2) [Identify MCU, Multicast, Peer to Peer]
- Interactive conferences
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- User bandwidth control
- - Adjustable frame rate
- - Adjustable compression ratio
- - Adjustable image size
- Dynamic addition/removal of users during conference
- Conference participation control (private, no eavesdropping)
- H.323
- Other CODECs supported (list)
- Dynamic bandwidth control
- - Adjustable frame rate
- - Adjustable compression ratio
- - Adjustable image size
- Adapt to lowest common denominator
- Rate governing
- Save video conference
- Frame grab a video image

- Gateways to other conferencing formats supported (list)

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- Add/remove users during web browsing session
- Establish roles (e.g., session leader, participants)
- Transfer of roles (e.g., session leader, participants)
- Secure web browsing sessions (private, no eavesdropping)

Shared Video

- Operating System (Solaris 2.5.1, HP-UX 9.0.7, NT 3.5.1, NT 4.0)
- TCP/IP
- Multi-user sharing (>2) [Identify MCU, Multicast, Peer to Peer]
- Ability to add/remove users during video sharing session
- Ability to share digitized video or NTSC video feed
- Ability to manipulate digitized video (e.g., Play, stop, fast forward, frame forward, reverse, frame reverse, pause)
- Ability to annotate live or paused video on an overlay (e.g., course of action annotations over PREDATOR feed) by frame grabbing video image and annotations and save to file (including JPEG, Postcript and GIF)
- Secure shared video sessions (private, no eavesdropping)